

# **Mountaintop Mining/Valley Fill Environmental Impact Statement Technical Study**

## **Work Plan for Mine Dust and Blasting Fumes**

**Proposal by Dr. Gerry Finfinger**

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**7/27/99**

### ***I. Introduction***

This proposal to study dust and blasting fumes emanating from surface coal mining operations in West Virginia was developed by Dr. Gerry Finfinger, Department of Mining Engineering, West Virginia University, to be carried out by a team at the University at his direction. The study was prepared in consultation with the U.S. Office of Surface Mining Reclamation and Enforcement (OSM) and addresses an issue which was especially prominent in the deliberations of the West Virginia Governor's Task Force..

The study findings will be incorporated into the overall assessment of how citizens and communities are affected by large scale surface coal mining, particularly mountaintop mining operations in West Virginia. The study will complement information collection efforts being carried out by four Federal agencies and the West Virginia Division of Environmental Protection to support the programmatic Environmental Impact Statement (EIS) on mountaintop mining and associated valley fills currently being prepared under the National Environmental Policy Act.

### **II. Problem Statement**

Complaints from communities in the area of surface mining operations typically focus on the problems of increased dust generation, odors from blasting fumes, damaging and non-damaging vibration levels, fly rock, and excessive noise levels. Blasting designs are required to be specifically engineered to minimize the problems of fly rock and to ensure that ground vibration and air blast levels are low enough to prevent damage to existing structures, but little research has been conducted to fully characterize the other issues. Dust and fume generation is a function of the blast design and the prevailing atmospheric conditions, such as wind direction and speed.

Many issues on the quality of life were raised by the public during the EIS scoping meetings. One issue was the health effects of the dust generated by either blasting or mining equipment at a mining operation. The West Virginia Governor's Task Force on Mountaintop Removal and Related Mining Practices, Committee on the Impact on the People, found that blasting creates the greatest negative impact on the people who are directly affected by the activity of mountaintop removal mining. The primary negative impacts are noise, vibration, air shock, dust, and property damage. Noise and dust from mining activities other than blasting are also problems.

### **III. Information Needs**

The former U.S. Bureau of Mines and others have conducted many studies over the years on blasting and its environmental effects on ground vibrations, airblast, flyrock, structures, and water wells. Vibration studies show that vibrations attenuate predictably away from a blast, regardless of the blast size. However, there are directional differences. Airblast studies show that airblast is most strongly affected by the degree of blast confinement, wind direction and temperature inversions. Flyrock potential depends on geologic conditions and amount of confinement. Cast blasts are lightly confined intentionally to displace the rock with explosive energy.

Vibration effect of structures are addressed in the U.S. Bureau of Mines, Report of Investigations 8507, 1980. The report formed the basis for the current OSM regulations. An OSM-funded report, completed in 1997, confirmed the earlier study.

The Bureau of Mines research on blasting near water wells, published in 1987, indicated that well water quantities are not affected by blast induced ground vibrations. Temporary minor effects on quality in terms of turbidity were observed, but no significant chemical changes were noted.

Other ongoing efforts include:

Nationwide Blasting Work Group: This group was initiated by OSM and includes Federal and State people responsible for regulating coal mine blasting. It has been working since 1995 on blasting-related issues, particularly the prevention of property damage and injury to people. Through the meetings, the participants have become more aware of the critical elements necessary for review of blasting complaints, and more consistent application of the performance standards has also been achieved.

Blasting citizens complaints - data collection, analysis and review: OSM has a pilot study underway to identify any trends in complaints that may help Federal and State officials resolve the numerous complaints they receive annually. The information from this review will help categorize blasting complaints in a systematic way to illustrate complaint diversity, complaint spatial relation to the mine, compliance methods used by the mine, contact level by the regulatory authority, final disposition of the complaint, and mitigative measures taken.

Blast Log Evaluations: Another OSM study in West Virginia and Kentucky is looking at the accuracy of blast logs. Accurate logs allow the investigator to resolve complaints quickly. OSM personnel are entering blast log data into a spreadsheet. The data will be cross tabulated to determine their accuracy. The two most critical components being checked are the blast location and explosive charge weight. This will allow verification of the distance from the blast to the nearest structure and the amount of explosives detonating within 8-milliseconds.

Little research has been done on fumes and dust resulting from blasting. Thus, the study proposal

described below will contribute valuable information for the EIS.

#### **IV. Methods to Address the Information Needs**

West Virginia University proposes to evaluate mine generated dust and blasting generated fumes as outlined below:

Phase I WVU will review, analyze and compile the technical literature and relevant data. The literature review will focus on the issues of dust generation and fume generation. A field testing protocol will be developed and all equipment needs for collecting dust samples and fume measurements will be identified and purchased. The fugitive dust gathering system will allow for the determination of the composition and size distribution of the dust. The fume monitoring (gas chromatograph) will allow for determining the concentrations and species of gases generated from the blasting operation. This portion of the study will be coordinated with the WVDEP and/or the WVU Political Science Department (performing a quality of life survey) to ensure the selection of appropriate field sites. **(3 months)**

Phase II A field monitoring study will be conducted where dust and fume measurements will be collected from one (or possibly two) mine sites. The final number of sites studied will be determined after the completion of Phase I. The field monitoring is designed to last for up to 6 months to ensure the data is representative of seasonal changes. The instrumentation design and requirements for each monitoring site will be specific to the surrounding conditions but it is envisioned that at least two dust monitoring locations and two fume monitoring locations will be established at each mine site. In addition to the monitoring instrumentation, several meteorological stations will be installed to determine wind speed and direction. **(6 months)**

Phase III The field investigation data will be analyzed and a report will be prepared. The report will include all collected data including blast designs. The information collected from the field monitoring phase will serve as a guide for future field investigations and for comparative purposes for assessing expected dust and fume levels. The data collected will also be compared to existing air quality standards and may assist in the development of performance standards. A preliminary technical report will be completed for delivery in April 2000 and a final report will be completed in September 2000. **(3 months)**

#### **V. Projected Study Costs**

State agency personnel. Contracting with West Virginia University offers the opportunity to meet the skill needs and time requirements of the EIS in a cost-effective manner. The following cost estimates were developed to complete the study within 12 months.

The preliminary cost estimate breakdown is: 1. Equipment                      \$ 20,000

2. Travel	\$ 3,000
3. Personnel	<u>\$ 40,000</u>
<b>Total</b>	<b>\$ 63,000</b>